Amendments to the Claims

Please amend Claims 1, 6-8, 14-17, 22, 24, 29, 34, 38, 40, 45, 46, 55, 56, and 60. Please add news Claims 67 and 68. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Current amended) A system for transferring synchronous optical network/synchronous digital hierarchy (SONET/SDH) frames between a first and second node comprising:

a demultiplexer to map frame markers used to generate framing pulses and frame bytes of a SONET/SDH ~~frames~~ frame onto a plurality of data channels;

an encoder to encode and translate ~~data~~ the frame markers and frame bytes on each data channel for transmission;

a first de-skewing processor to overwrite [[a]] the frame ~~marker~~ markers on the SONET/SDH ~~frames~~ frame with [[a]] unique frame ~~marker~~ markers to aid in de-skewing the plurality of data channels and to maintain the framing pulses;

a second de-skewing processor to de-skew the data from the plurality of data channels based on the unique frame ~~marker~~ markers and to restore the frame ~~marker~~ markers on the SONET/SDH frames to recover the framing pulses;

a decoder to decode and translate ~~data~~ the framing markers and frame bytes on each data channel for reception; and

a multiplexer to map the plurality of data channels and the recovered framing pulses onto the SONET/SDH ~~frames~~ frame.

2. (Original) The system of Claim 1 wherein the demultiplexer includes a framer to determine the position of frame markers in the data.

3. (Original) The system of Claim 1 wherein the first and second node communicate over parallel transmission links.

4. (Original) The system of Claim 3 wherein the parallel transmission links comprise a parallel-optics based transmission link.

5. (Original) The system of Claim 3 wherein the parallel transmission link comprises a wavelength division multiplexed (WDM) based transmission link.

6. (Currently Amended) A method of transferring synchronous optical network/synchronous digital hierarchy (SONET/SDH) frames between a first and second node comprising:

mapping frame markers used to generate framing pulses and frame bytes of a ~~the~~ SONET/SDH ~~frames~~ frame onto a plurality of data channels;

overwriting [[a]] the frame ~~marker~~ markers on the SONET/SDH ~~frames~~ frame with [[a]] unique frame ~~marker~~ markers to aid in de-skewing the plurality of data channels and to maintain the framing pulses; and

transferring the SONET/SDH ~~frames~~ frame over a plurality of parallel transmission links.

7. (Currently Amended) The method of Claim 6 wherein transferring the SONET/SDH ~~frames~~ frame over parallel transmission links includes transmitting and receiving the SONET/SDH ~~frames~~ frame over parallel transmission links.

8. (Currently Amended) The method of Claim 7 includes byte stripping bytes of the SONET/SDH ~~frames~~ frame onto parallel data channels.

9. (Original) The method of Claim 7 further comprising encoding each data channel for data formatting.

10. (Original) The method of Claim 7 further comprising framing each data channel.

11. (Original) The method of Claim 6 wherein the parallel transmission links comprises a parallel-optics based transmission link.

12. (Original) The method of Claim 11 wherein the optical transmission link comprises at least 12 fibers.

13. (Original) The method of Claim 6 wherein the parallel transmission links comprises a wavelength division multiplexed (WDM) based transmission link.

14. (Currently Amended) The method of Claim 6 wherein the rate of SONET/SDH ~~frames~~ frame corresponds to an OC-192/STM-64 line rate.

15. (Currently Amended) The methods of Claim 7 wherein receiving SONET/SDH ~~frames~~ frame further comprises, receiving data from each of the parallel transmission links; decoding each data channel; realigning each data channel to compensate for an inter-channel skew; and recombining the data channels into a SONET/SDH frame.

16. (Currently Amended) A method of transmitting synchronous optical network (SONET)/Synchronous digital hierarchy (SDH) frames over a parallel transmission system comprising:

mapping frame markers used to generate framing pulses and frame bytes of a SONET/SDH ~~frames~~ frame onto data channels;

overwriting [[a]] the frame ~~marker~~ markers on the SONET/SDH ~~frames~~ frame with [[a]] unique frame ~~marker~~ markers to aid in de-skewing the plurality of data channels and to maintain the framing pulses;

transmitting the SONET/SDH ~~frames~~ frame over parallel transmission links.

17. (Currently Amended) A method of transmitting SONET/SDH frames over a parallel transmission system, ~~the~~ a SONET/SDH ~~frames~~ frame having frame markers used to generate framing pulses and frame bytes, the method comprising:

determining the position of the frame markers;

byte stripping bytes of the SONET/SDH ~~frames~~ frame onto a plurality of parallel of data channels;

encoding each data channel;

overwriting [[a]] the frame ~~marker~~ markers on the SONET/SDH ~~frames~~ frame with [[a]] unique frame ~~marker~~ markers to aid in de-skewing the plurality of data channels and to maintain the framing pulses; and

transmitting the channels over parallel transmission links.

18. (Original) The method of Claim 17 wherein the parallel transmission links comprises a parallel-optics based transmission link.

19. (Original) The method of Claim 18 wherein the optical transmission link uses at least 12 fibers.

20. (Original) The method of Claim 17 wherein the parallel transmission links comprises a wavelength division multiplexed (WDM) based transmission link.

21. (Original) The method of Claim 17 wherein the rate of SONET/SDH frames corresponds to an OC-192/STM-64 line rate.

22. (Currently Amended) The method of Claim 17 wherein ~~frame delimiting is performed by~~ overwriting the frame markers on the SONET/SDH frame includes overwriting at least a SONET byte on each data channel.

23. (Original) The method of Claim 17 wherein at least a first three SONET framing bytes are overwritten on each data channel.

24. (Currently Amended) The method of Claim 17 wherein unique frame ~~delimiters~~ markers are used on a subset of the data channels.

25. (Previously Presented) The method of Claim 24 wherein a first frame delimiter is used for a first half of the data channels and a second frame delimiter is used for a second half of the data channels.

26. (Original) The method of Claim 17, wherein each channel is encoded using a block-code.

27. (Original) The method of Claim 17 wherein the data channels are logically combined in such a manner to enable recovery of a single data channel and the logically combined channel exists as a separate data channel.

28. (Original) The method of Claim 17 wherein a further data channel carries cyclic redundancy check (CRC) bits for the plurality of data channels.

29. (Currently Amended) A method of receiving SONET/SDH frames over a parallel transmission system comprising:

recovering data from each transmission link;

decoding each data channel;

realigning each data channel based on a unique frame marker to compensate for an inter-channel skew;

restoring the unique frame marker to a frame marker normally on ~~the~~ a SONET/SDH ~~frames~~ frame to recover framing pulses; and

recombining the data channels and the recovered framing pulses into [[a]] the SONET/SDH frame.

30. (Original) The method of Claim 29, wherein the parallel transmission system comprises a parallel-optics based transmission link.

31. (Original) The method of Claim 30 wherein the optical transmission link uses at least 12 fibers.

32. (Original) The method of Claim 29 wherein the parallel transmission system comprises a wavelength division multiplexed (WDM) based transmission link.

33. (Original) The method of Claim 29 wherein the rate of SONET/SDH frames corresponds to an OC-192/STM-64 line rate.

34. (Currently Amended) The method of Claim 29 wherein the receiver detects a polarity of the transmission links by use of unique frame ~~delimiters~~ markers on subsets of the data channels.

35. (Original) The method of Claim 30 further comprising a loss of synchronization condition on a channel if a plurality of code word violations occur.

36. (Previously Presented) The method of Claim 35 wherein a channel failure is detected using the loss of synchronization condition.

37. (Previously Presented) The method of Claim 29 further comprising detecting and correcting errors on the data channels by calculating a cyclic redundancy check (CRC) for a block of data on the data channels; comparing the CRC to a corresponding, separately-transmitted CRC for the block; and recovering the data from a protection channel if the CRC's do not match.

38. (Currently Amended) A transceiver module for transferring SONET/SDH frames between a first and second node, comprising:

a converter circuit to adapt incoming signals for transmission on parallel transmission links having a first transmission link and at least one second transmission link;

a first de-skewing processor to overwrite [[a]] first frame ~~marker~~ markers on the SONET/SDH ~~frames~~ frame with [[a]] first unique frame ~~marker~~ markers to aid in de-skewing first data channels and to maintain framing pulses

a parallel transmit optic module to transmit the first data channels on the first parallel transmission ~~links~~ link;

a parallel receive optic module to receive second data channels on the at least one second parallel transmission ~~links~~ link; and

a second de-skewing processor to de-skew the data from the second data channels based on [[a]] second unique frame ~~marker~~ markers and to restore the frame ~~marker~~ markers on the SONET/SDH frames to recover the framing pulses.

39. (Previously Presented) The transceiver module of Claim 38 wherein a line rate for transferring SONET/SDH frames corresponds to an OC-192/STM-64 line rate.

40. (Currently Amended) The transceiver module of Claim 38 wherein the first and second node communicate over the parallel transmission links.

41. (Original) The transceiver module of Claim 40 wherein the parallel transmission links comprise a parallel-optics based transmission link.

42. (Original) The transceiver module of Claim 40 wherein the parallel transmission link comprises a wavelength division multiplexed (WDM) based transmission link.

43. (Previously Presented) The transceiver module of Claim 38 wherein the converter circuit interfaces with a framer chip.

44. (Original) The transceiver module of Claim 38 wherein the parallel transmit optic module is integral with the parallel receive optic module.

45. (Currently Amended) The system of Claim 1 wherein the encoder or the demultiplexer overwrites the frame ~~marker~~ markers on each channel with the unique frame ~~marker~~ markers used for automatic skew compensation.

46. (Currently Amended) The system of Claim 45 wherein the unique frame ~~marker~~ markers are different for each channel.

47. (Previously Presented) The system of Claim 46 further including a ribbon patchcord with multiple optical fibers on which the data channels are transmitted between the encoder and decoder, and wherein the unique frame markers are used to detect if the optical fibers cause a crossover between or among the channels.

48. (Previously Presented) The system of Claim 47 further including an aligner that re-orders the channels based on the unique frame markers to compensate for a crossover of optical fibers in the ribbon patchcord.

49. (Previously Presented) The system of Claim 47 further including an aligner that re-orders data on the channels as a function of the unique frame markers.

50. (Previously Presented) The system of Claim 1 further including an aligner that de-skews individual channels by using the unique frame markers as delimiters to compensate for inter-channel skew that occurs due to propagation delay differences between or among the channels.

51. (Previously Presented) The system of Claim 1 wherein the data channels are logically combined in such a manner to enable recovery of a single data channel and the logically combined channel exists as a separate data channel.

52. (Previously Presented) The system of Claim 1 wherein a further channel carries bits used for error correction for the plurality of data channels.

53. (Previously Presented) The transceiver module of Claim 38 wherein the de-skewing process is integrated with the converter circuit.

54. (Previously Presented) The transceiver module of Claim 38 wherein the first de-skewing processor and second de-skewing processor are the same processor.

55. (Currently Amended) A system for transferring synchronous optical network/synchronous digital hierarchy (SONET/SDH) frames, the system comprising:

a demultiplexer to map incoming frames of data having a given number of bits onto a plurality of data channels in a manner supporting de-skewing the data from the data channels without increasing the given number of bits on the data channels and maintaining framing pulses; and

a de-skewing processor to deskew the data from the data channels based on the mapped incoming frames and to recover the framing pulses.

56. (Currently Amended) The system of Claim 55 wherein the demultiplexer includes a framer to determine the position of frame markers, used to generate framing pulses, in the data.

57. (Previously Presented) The system of Claim 55 wherein the demultiplexer is in a first node and the de-skewing processor is in a second node, the first and second nodes communicating over parallel transmission links.

58. (Previously Presented) The system of Claim 57 wherein the parallel transmission links comprise a parallel-optics based transmission link.

59. (Previously Presented) The system of Claim 57 wherein the parallel transmission link comprises a wavelength division multiplexed (WDM) based transmission link.

60. (Currently Amended) A method of transferring SONET/SDH frames over a parallel transmission system comprising:

mapping incoming frames of data having a given number of bits onto a plurality of data channels in a manner supporting de-skewing the data from the data channels

without increasing the given number of bits on the data channel and maintaining framing pulses; ~~and~~

de-skewing the data from the data channels based on the mapping; and

recovering the framing pulses.

61. (Previously Presented) The method of Claim 60 further including transmitting the data channels via a parallel-optics based transmission link.

62. (Previously Presented) The method of Claim 61 wherein the parallel-optics based transmission link uses at least twelve fibers.

63. (Previously Presented) The method of Claim 60 wherein transmitting the data channels includes wavelength division multiplexing (WDM) the data channels.

64. (Previously Presented) The method of Claim 60 wherein the rate of SONET/SDH frames corresponds to an OC-192/STM-64 line rate.

65. (Previously Presented) The method of Claim 60 further including detecting a polarity of the transmission links by use of unique frame markers on subsets of the data channels.

66. (Previously Presented) The method of Claim 60 further comprising detecting and correcting errors on the data channels by calculating a cyclic redundancy check (CRC) for a block of data on the data channels; comparing the CRC to a corresponding, separately-transmitted CRC for the block; and recovering the data from a protection channel if the CRC's do not match.

67. (New) An apparatus for transmitting synchronous optical network (SONET)/Synchronous digital hierarchy (SDH) frames over a parallel transmission system, the apparatus comprising:

a demultiplexer to map frame markers used to generate framing pulses and frame bytes of a SONET/SDH frame onto data channels;

a de-skewing processor to overwrite the frame markers on the SONET/SDH frame with unique frame markers to aid in de-skewing the plurality of data channels and to maintain the framing pulses; and

a transmitter to transmit the SONET/SDH frame over parallel transmission links.

68. (New) An apparatus for transmitting SONET/SDH frames over a parallel transmission system, a SONET/SDH frame having frame markers used to generate framing pulses and frame bytes, the apparatus comprising:

a framer to determine the position of the frame markers;

a demultiplexer to byte stripe bytes of the SONET/SDH frame onto a plurality of parallel of data channels;

an encoder to encode each data channel;

a de-skewing processor to overwrite the frame markers on the SONET/SDH frame with unique frame markers to aid in de-skewing the plurality of data channels and to maintain the framing pulses; and

a transmitter to transmit the channels over parallel transmission links.